

**WHAT IS CLAIMED IS:**

1. A method for removing chemical and biological contaminants from water comprising contacting the water with an effective amount of at least one ruthenium compound.

2. The method according to claim 1 wherein the ruthenium compound is selected from the group consisting of  $\text{RuO}_2 \cdot x\text{H}_2\text{O}$  where x denotes the degree of hydration, Ru-Fe oxyhydroxides, Ru-Fe hydroxides, Ru-Fe oxides, Ru-Mn oxides, Ru-Mn oxyhydroxides, Ru-Mn hydroxides, Ru-Mn, Ru-Al oxyhydroxides, Ru-Al hydroxides, and Ru-Al oxides.

3. The method according to claim 1 wherein the ruthenium compound is  $\text{RuO}_2 \cdot x\text{H}_2\text{O}$  where x denotes the degree of hydration.

4. The method according to claim 1 wherein the ruthenium compound is coated onto or complexed with at least one substance selected from the group consisting of sand, silica, zeolites, nylon, polystyrene, and cellulose.

5. The method according to claim 1 wherein the chemical and biological contaminants are selected from chemical compounds and biological substances which are positively or negatively charged in ionic form or which are charged compounds or substances.

6. The method according to claim 5 wherein the chemical and biological contaminants are selected from the group consisting of cationic-charged forms, salts, and complexes.

7. The method according to claim 6 wherein the cationic-charged forms, salts and complexes are selected from the group consisting of. nitrate salts and sulfate salts of Ca, Cu, Cd, Ni, Pb, Zn, Cr, Co, Hg, U, Mn, and Mg.

8. The method according to claim 5 wherein the chemical and biological contaminants are selected from the group consisting of anions and anionic species.

9. The method according to claim 8 wherein the anions and anionic species are selected from the group consisting of perchlorate, chloride, bromide, arsenate, arsenite, phosphate, nitrate, sulfate and associated salts and compounds of the anions and anionic species.

10. The method according to claim 9 wherein the associated salts and compounds of the anions are selected from the group consisting of sodium arsenate and potassium bromide.

11. The method according to claim 5 wherein the chemical and biological contaminants are selected from the group consisting of charged and polar pesticides, fuels, pharmaceuticals, endocrine disruptors, and disinfection by-products.

12. The method according to claim 5 wherein the chemical and biological contaminants are selected from the group consisting of biological contaminants with charged surfaces.

13. The method according to claim 12 wherein the biological contaminants with charged surfaces are selected from the group consisting of bacteria, oocytes, and spores.

14. A method for remediating soil or sediment comprising contacting the soil or sediment with an effective amount of at least one ruthenium compound.

15. The method according to claim 14 wherein the ruthenium compound is selected from the group consisting of  $\text{RuO}_2 \cdot x\text{H}_2\text{O}$  where  $x$  denotes the degree of hydration, Ru-Fe oxyhydroxides, Ru-Fe hydroxides, Ru-Fe oxides, Ru-Mn oxides, Ru-Mn oxyhydroxides, Ru-Mn hydroxides, Ru-Mn, Ru-Al oxyhydroxides, Ru-Al hydroxides, and Ru-Al oxides.

16. The method according to claim 15 wherein the ruthenium compound is  $\text{RuO}_2 \cdot x\text{H}_2\text{O}$  where  $x$  denotes the degree of hydration.

17. The method according to claim 14 wherein the ruthenium compound is coated onto or complexed with at least one substance selected from the group consisting of sand, silica, zeolites, nylon, polystyrene, and cellulose.

18. The method according to claim 14 wherein the chemical and biological contaminants are selected from

chemical compounds and biological substances which are positively or negatively charged in ionic form or which are charged compounds or substances.

19. The method according to claim 18 wherein the chemical and biological contaminants are selected from the group consisting of cationic-charged forms, salts, and complexes.

20. The method according to claim 19 wherein the cationic-charged forms, salts and complexes are selected from the group consisting of. nitrate salts and sulfate salts of Ca, Cu, Cd, Ni, Pb, Zn, Cr, Co, Hg, U, Mn, and Mg.

21. The method according to claim 18 wherein the chemical and biological contaminants are selected from the group consisting of anions and anionic species.

22. The method according to claim 22 wherein the anions and anionic species are selected from the group consisting of perchlorate, chloride, bromide, arsenate, arsenite, phosphate, nitrate, sulfate and associated salts and compounds of the anions and anionic species.

23. The method according to claim 22 wherein the associated salts and compounds of the anions are selected from the group consisting of sodium arsenate and potassium bromide.

24. The method according to claim 18 wherein the chemical and biological contaminants are selected from the

group consisting of charged and polar pesticides, fuels, pharmaceuticals, endocrine disruptors, and disinfection by-products.

25. The method according to claim 18 wherein the chemical and biological contaminants are selected from the group consisting of biological contaminants with charged surfaces.

26. The method according to claim 25 wherein the biological contaminants with charged surfaces are selected from the group consisting of bacteria, oocytes, and spores.